WHAT IS CLAIMED IS:

1. A semiconductor device comprising:

as a core substrate of a high thermo conductive ceramic substrate having circuit patterns on opposed surfaces,

the high thermo conductive ceramic substrate having on one surface a first circuit board of at least one layer having a first cavity structure, and on the other surface a second circuit board of at least one layer having a second cavity structure;

a first active element mounted on the circuit pattern on the high thermo conductive ceramic substrate within the first cavity;

a second active element mounted on the circuit pattern on the high thermo conductive ceramic substrate within the second cavity; and

an external electrode integrated with the surface of the second circuit board,

the first circuit board surface being covered; wherein

a heat dissipation via is formed on the second circuit board, the high thermo conductive ceramic substrate and the external electrode on the surface of the second circuit board are connected thermally to each other, and heat of at least one active element selected from the first active element and the second active element is dissipated outward through the high thermo conductive ceramic substrate, the heat dissipation via and the external electrode on the surface of the second circuit board.

2. The semiconductor device according to claim 1, wherein on a lower surface of the second circuit board, a second high thermo conductive ceramic substrate made of the same material as the first high thermo conductive ceramic substrate and having a third cavity structure is formed so that the second cavity and the third cavity are overlapped.

3. The semiconductor device according to claim 1, wherein either the first active element or the second semiconductor element is a high-frequency power semiconductor element, and the other active element is a controlling semiconductor element having a function of driving and controlling the power semiconductor element.

4. The semiconductor device according to claim 1, wherein at least one

passive element selected from the group consisting of an inductor, a capacitor and a resistor is packaged on the surface of the first circuit board.

5. The semiconductor device according to claim 1, wherein either the first active element or the second active element is a filter element, and the other active element is a switching element.

6. The semiconductor device according to claim 1, wherein the first circuit board has on its surface a region for mounting a power semiconductor element, and a via hole filled with a metal or a metal-containing resin is formed in the region so as to be connected thermally with the high thermo conductive ceramic substrate.

7. The semiconductor device according to claim 1, wherein the first circuit board and the second circuit board are at least one kind of circuit board selected from the group consisting of a ceramic substrate and a substrate prepared by impregnating a resin in a reinforcing fiber structure.

8. The semiconductor device according to claim 1, wherein a plurality of the cavity structures are provided on the both surfaces of the high thermo conductive ceramic substrate.

9. The semiconductor device according to claim 8, wherein an electroconductive via or a circuit pattern to be connected to a ground is formed on an inner layer or a surface layer of spacing between the plural cavities of the first circuit board.

10. The semiconductor device according to claim 8, wherein an electroconductive via or a circuit pattern to be connected to a ground is formed on an inner layer or a surface layer of spacing between the plural cavities of the second circuit board.

11. The semiconductor device according to claim 8, wherein a power semiconductor element and a filter element are mounted respectively on the circuit pattern on the high thermo conductive ceramic substrate within the cavity of the first circuit board.

12. The semiconductor device according to claim 11, wherein the filter element mounted on the first circuit board is packaged by flip-chip bonding.

13. The semiconductor device according to claim 8, wherein a controlling element and a switching element are mounted on the circuit pattern on the high thermo conductive ceramic substrate within cavities of the second circuit board.

14. The semiconductor device according to claim 13, wherein the controlling element or the switching element is packaged by flip-chip bonding.

15. The semiconductor device according to claim 1, wherein the heat dissipation external electrode on the surface of the second circuit board is connected to a ground.

16. The semiconductor device according to claim 1, wherein the high thermo conductive ceramic substrate comprises a first ceramic substrate and a second ceramic substrate, and a plurality of stepped cavities are formed in the second ceramic substrate.

17. The semiconductor device according to claim 16, wherein circuit patterns to be connected to a ground are formed in regions in the vicinity of the cavities of the first and second ceramic substrates, at the steps of the cavities and regions in the vicinity of the cavity steps, a region in the back face of the cavity for a filter element of the high thermo conductive ceramic substrate, and among the plural cavities on the second ceramic substrate;

the controlling semiconductor element and the switching element are mounted by flip-chip bonding onto the circuit pattern of the high thermo conductive ceramic substrate within a cavity of the first ceramic substrate, a power semiconductor element and at least one filter element selected from the group consisting of a SAW filter element, a dielectric filter element and a LC filter element, are mounted on the circuit pattern on the high thermo conductive ceramic substrate within the cavity of the second ceramic substrate, the SAW filter element is mounted by flip-chip bonding; and

the circuit pattern at the cavity steps of the second ceramic substrate and a metal plate are adhered by an electroconductive adhesive

and sealed.

18. The semiconductor device according to claim 1, wherein the high thermo conductive ceramic substrate is made of a material selected from the group consisting of alumina, aluminum nitride, graphite, silicon carbide, and boron nitride.

19. The semiconductor device according to claim 1, wherein the heat dissipation via is formed by being filled with an electroconductive paste containing a metal filler of 65 wt% to 95 wt% and a thermosetting resin of 5 wt% to 35 wt% and curing the electroconductive paste.

20. The semiconductor device according to claim 1, wherein the heat dissipation via is arranged on the back face sides or in the vicinity of the first active element and the second active element.